

We claim:

1. A liquid fuel reservoir for a liquid fuel cell, said liquid fuel reservoir comprising a container comprising walls defining a container volume capable of holding a liquid fuel, a first port through a wall of the container capable of discharging the liquid fuel to a location exterior of the container volume, at least one extremity remote from the first port and a pressurized pallet or bladder, wherein the first port has inner and outer ends; and

a wicking structure within the container volume and into which the liquid fuel can wick by capillary action and from which the liquid fuel may subsequently be discharged, the wicking structure

(a) having a solid wicking structure volume which is no more than 50% of the container volume;

(b) being in fluid communication with the first; and

(c) extending from proximate the at least one extremity to proximate the inner end of the first port in order to be able to place the at least one extremity in fluid communication with the first port, in any orientation of the container, and at substantially any stage of liquid fuel depletion, to permit liquid fuel located proximate the at least one extremity to be wicked to the first port.

2. The liquid fuel reservoir of claim 1, wherein the solid wicking structure volume is no more than 40% of the container volume.

3. The liquid fuel reservoir of claim 2, wherein the solid wicking structure volume is less than 20% of the container volume.

4. The liquid fuel reservoir of claim 3, wherein the solid wicking structure volume is less than 10% of the container volume.

5. The liquid fuel reservoir of claim 4, wherein the solid wicking structure volume is no more than 5% of the container volume.

6. The liquid fuel reservoir of claim 5, wherein the solid wicking structure volume is no more than 3% of the container volume.

7. The liquid fuel reservoir of claim 6, wherein the solid wicking structure volume is about 1% of the container volume.

8. The liquid fuel reservoir of claim 1, further comprising a retainer shaped to hold the wicking structure in a desired orientation within the container volume.

9. The liquid fuel reservoir of claim 8, wherein said retainer is shaped to hold at least one portion of the wicking structure proximate the at least one extremity of the container.

10. The liquid fuel reservoir of claim 9, wherein the retainer is perforated.

11. The liquid fuel reservoir of claim 9, wherein the retainer is a screen, a slotted sheet or a perforated sheet.

12. The liquid fuel reservoir of claim 8, wherein the retainer has a solid volume of less than about 10% of the container volume.

13. The liquid fuel reservoir of claim 12, wherein the retainer has a solid volume of less than about 5% of the container volume.

14. The liquid fuel reservoir of claim 13, wherein the retainer has a solid volume of about 1% of the container volume.

15. The liquid fuel reservoir of claim 1, wherein the pressurized pallet or bladder comprises a compressible porous material.

16. The liquid fuel reservoir of claim 1, wherein the walls of the container comprise at least a proximal wall through which the first extends, a distal wall remote from the first, and a side wall, and the wicking structure contacts at least one portion of an inner surface of the distal wall of the container.

17. The liquid fuel reservoir of claim 16, wherein the wicking structure further contacts at least one portion of an inner surface of the side wall of the container.

18. The liquid fuel reservoir of claim 17, wherein the wicking structure further contacts at least one portion of an inner surface of the proximal wall of the container.

19. The liquid fuel reservoir of claim 16, wherein the wicking structure further contacts at least one portion of an inner surface of the proximal wall of the container.

20. The liquid fuel reservoir of claim 9, wherein the walls of the container comprise at least a proximal wall through which the first port enters, a distal wall remote from the first port, and a side wall, and the retainer holds the wicking structure in an orientation such that the wicking structure contacts at least one portion of an inner surface of the distal wall of the container.

21. The liquid fuel reservoir of claim 20, wherein the retainer holds the wicking structure in an orientation such that the wicking structure further contacts at least one portion of an inner surface of the side wall of the container.

22. The liquid fuel reservoir of claim 21, wherein the retainer holds the wicking structure in an orientation such that the wicking structure further contacts at least one portion of an inner surface of the proximal wall of the container.

23. The liquid fuel reservoir of claim 20, wherein the retainer holds the wicking structure in an orientation such that the wicking structure further contacts at least one portion of an inner surface of the proximal wall of the container.

24. The liquid fuel reservoir of claim 8, wherein the wicking structure is mounted over at least one portion of the retainer.

25. The liquid fuel reservoir of claim 24, wherein the retainer is attached to a cap that engages a distal end of the container.

26. The liquid fuel reservoir of claim 25, wherein the wicking structure is slidably insertable into the volume of the container.

27. The liquid fuel reservoir of claim 8, wherein the retainer comprises a connector extending from the inner surface of a distal or side wall of the container, said connector gripping a portion of the wicking structure to hold it in position within the container.

28. The liquid fuel reservoir of claim 27, wherein the connector is a clamp, a combination of clamps, a toothed edge or a VELCRO nub.

29. The liquid fuel reservoir of claim 1, wherein the wicking structure is connected to the container by heat sealing, ultrasonic welding, adhesive or being molded in place via injection molding.

30. The liquid fuel reservoir of claim 1, wherein the wicking structure comprises a wicking structure material, and wherein said wicking structure material is selected from the group consisting of foams, bundled fibers, matted fibers, nonwoven fibers, woven fibers, needled fibers, porous polymers, Porex, and inorganic porous materials.

31. The liquid fuel reservoir of claim 30, wherein said wicking structure material is selected from the group consisting of foams, bundled fibers, matted fibers, needled fibers, nonwoven fibers, woven fibers, and porous polymers made by compressing polymer beads.

32. The liquid fuel reservoir of claim 31, wherein the wicking structure material is selected from the group consisting of

polyurethane foam,

melamine foam,

polyvinyl alcohol foam,

nonwoven felts of polyamide, polypropylene, polyethylene, polyester, cellulose, modified cellulose, polyacrylonitrile, or mixtures thereof, and

bundled, matted, needled or woven fibers of cellulose, modified cellulose, polyester, polypropylene, polyethylene, polyacrylonitrile, or mixtures thereof.

33. The liquid fuel reservoir of claim 32, wherein the wicking structure material is a polyurethane foam.

34. The liquid fuel reservoir of claim 33, wherein the wicking structure material is a polyurethane foam having a density in the range of about 0.5 to about 45 pounds per cubic foot, and pore sizes in the range of about 10 to about 200 pores per linear inch.

35. The liquid fuel reservoir of claim 34, wherein the wicking structure material is a polyurethane foam having a density in the range of about 0.5 to about 25 pounds per cubic foot, and pore sizes in the range of about 10 to about 200 pores per linear inch.

36. The liquid fuel reservoir of claim 35, wherein the wicking structure material is a polyurethane foam having a density in the range of about 0.5 to about 15 pounds per cubic foot, and pore sizes in the range of about 40 to about 200 pores per linear inch.

37. The liquid fuel reservoir of claim 36, wherein the wicking structure material is a polyurethane foam having a density in the range of about 0.5 to about 10 pounds per cubic foot, and pore sizes in the range of about 75 to about 200 pores per linear inch.

5 38. The liquid fuel reservoir of claim 33, wherein the wicking structure material is selected from the group consisting of a felted polyurethane foam, reticulated polyurethane foam, and felted reticulated polyurethane foam.

10 39. The liquid fuel reservoir of claim 38, wherein the wicking structure material is a felted polyurethane foam or felted reticulated polyurethane foam having a density in the range of about 1.5 to about 60 pounds per cubic foot, prepared with a compression ratio in the range of 1.1 to 30.

15 40. The liquid fuel reservoir of claim 1, further comprising a liquid delivery means in communication with the first port for delivering the liquid fuel out of the container through the first port.

41. The liquid fuel reservoir of claim 40, wherein the liquid delivery means is a pump.

20 42. The liquid fuel reservoir of claim 1, further comprising an inlet through a wall of the container, said inlet having a one-way valve to permit gas flow into the container volume and prevent liquid flow out of the container volume.

43. The liquid fuel reservoir of claim 42, further comprising a sealable, detachable cap that can be attached to an end of the first port exterior to the container to make the reservoir recyclable.

5 44. The liquid fuel reservoir of claim 43, wherein the cap comprises a membrane for the introduction of a liquid fuel into the container volume when the membrane is punctured with a needle, wherein the membrane is self-sealable after the needle is removed.

10 45. The liquid fuel reservoir of claim 42, further comprising a two-way valve in the first port for the introduction of a liquid fuel into the container volume to make the reservoir recyclable.

15 46. The liquid fuel reservoir of claim 1, wherein the container volume has a longest dimension, and wherein the wicking structure is capable of wicking the liquid fuel with a free rise wick height of at least one half of the longest dimension.

47. The liquid fuel reservoir of claim 46, wherein the wicking structure is capable of wicking the liquid fuel with a free rise wick height of at least the longest dimension.

20 48. The liquid fuel reservoir of claim 46, further comprising a retainer shaped to hold the wicking structure in a desired orientation within the container volume.



49. The liquid fuel reservoir of claim 48, wherein said retainer is shaped to hold at least one portion of the wicking structure proximate the at least one extremity of the container.

5 50. The liquid fuel reservoir of claim 49, wherein the retainer is perforated.

51. The liquid fuel reservoir of claim 49, wherein the retainer is a screen, a slotted sheet or a perforated sheet.

10 52. The liquid fuel reservoir of claim 48, wherein the retainer has a solid volume of less than about 10% of the container volume.

53. The liquid fuel reservoir of claim 46, wherein the walls of the container comprise at least a proximal wall through which the first port enters, a distal wall remote from the first port, and a side wall, and the wicking structure contacts at least one portion of an inner surface of the distal wall of the container.

54. The liquid fuel reservoir of claim 53, wherein the wicking structure further contacts at least one portion of an inner surface of the side wall of the container.

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55. The liquid fuel reservoir of claim 54, wherein the wicking structure further contacts at least one portion of an inner surface of the proximal wall of the container.

56. The liquid fuel reservoir of claim 53, wherein the wicking structure further contacts at least one portion of an inner surface of the proximal wall of the container.

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57. The liquid fuel reservoir of claim 48, wherein the wicking structure is mounted over at least one portion of the retainer.

5 58. The liquid fuel reservoir of claim 57, wherein the retainer is attached to a cap that engages a distal end of the container.

59. The liquid fuel reservoir of claim 58, wherein the wicking structure is slidably insertable into the container volume.

10 60. The liquid fuel reservoir of claim 46, wherein the wicking structure comprises a wicking structure material, and wherein said wicking structure material is selected from the group consisting of foams, bundled fibers, matted fibers, nonwoven fibers, woven fibers, needled fibers, porous polymers, Porex, and inorganic porous materials.

15 61. The liquid fuel reservoir of claim 60, wherein said wicking structure material is selected from the group consisting of foams, bundled fibers, matted fibers, needled fibers, nonwoven fibers, woven fibers, and porous polymers.

20 62. The liquid fuel reservoir of claim 61, wherein the wicking structure material is selected from the group consisting of polyurethane foam, melamine foam, polyvinyl alcohol foam, nonwoven felts of polyamide, polypropylene, polyethylene, polyester, cellulose, modified cellulose, polyacrylonitrile, or mixtures thereof, and bundled, matted, needled or woven fibers of cellulose, modified cellulose, polyester, polypropylene,  
25 polyethylene, polyacrylonitrile, or mixtures thereof.

63. The liquid fuel reservoir of claim 62, wherein the wicking structure material is a polyurethane foam.

5 64. The liquid fuel reservoir of claim 63, wherein the wicking structure material is selected from the group consisting of a felted polyurethane foam, reticulated polyurethane foam, and felted reticulated polyurethane foam.

10 65. The liquid fuel reservoir of claim 46, further comprising a liquid delivery means in communication with the first port for delivering the liquid fuel out of the container through the first port.

66. The liquid fuel reservoir of claim 65, wherein the liquid delivery means is a pump.

15 67. The liquid fuel reservoir of claim 46, further comprising an inlet through a wall of the container, said inlet having a one-way valve to permit gas flow into the container volume and prevent liquid flow out of the container volume.

20 68. The liquid fuel reservoir of claim 67, further comprising a sealable, removable cap that can be attached to an end of the first port exterior to the container to make the reservoir recyclable.

25 69. The liquid fuel reservoir of claim 68, wherein the cap comprises a membrane for the introduction of a liquid fuel into the container volume upon puncturing the membrane with a needle, wherein the membrane is self-sealable after the needle is removed.

70. The liquid fuel reservoir of claim 67, further comprising a two-way valve in the first port for the introduction of a liquid fuel into the container volume to make the reservoir recyclable.

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71. The liquid fuel reservoir of claim 1, wherein the wicking structure has an external volume of no more than about 50% of the container volume.

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72. The liquid fuel reservoir of claim 71, wherein the wicking structure has an external volume of no more than about 25% of the container volume.

73. The liquid fuel reservoir of claim 72, wherein the wicking structure has an external volume of no more than about 10% of the container volume.

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74. The liquid fuel reservoir of claim 1, having a liquid fuel delivery efficiency of at least 90%.

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75. The liquid fuel reservoir of claim 1, wherein the container has extremities remote from the first port, the wicking structure extending proximate the extremities to place the extremities in fluid communication with the first port, in any orientation of the container, and at substantially any stage of liquid fuel depletion, to permit liquid fuel located proximate the extremities to be wicked to the first port.

76. The liquid fuel reservoir of claim 75, further comprising a retainer inside the container to hold the wicking structure in a desired orientation within the container volume.

5 77. The liquid fuel reservoir of claim 76, wherein the retainer is perforated.

78. The liquid fuel reservoir of claim 76, wherein the retainer has a solid volume of no more than about 10% of the container volume.

10 79. The liquid fuel reservoir of claim 75, wherein the walls of the container comprise at least a proximal wall through which the first port enters, a distal wall remote from the first port, and a side wall, and the wicking structure contacts at least one portion of an inner surface of the distal wall of the container.

15 80. The liquid fuel reservoir of claim 79, wherein the wicking structure further contacts at least one portion of an inner surface of the side wall of the container.

81. The liquid fuel reservoir of claim 80, wherein the wicking structure further contacts at least one portion of an inner surface of the proximal wall of the container.

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82. The liquid fuel reservoir of claim 79, wherein the wicking structure further contacts at least one portion of an inner surface of the proximal wall of the container.

83. The liquid fuel reservoir of claim 75, wherein the wicking structure comprises a wicking structure material, and wherein said wicking structure material is selected from

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the group consisting of foams, bundled fibers, matted fibers, nonwoven fibers, woven fibers, needled fibers, porous polymers, Porex, and inorganic porous materials.

84. The liquid fuel reservoir of claim 83, wherein said wicking structure material is selected from the group consisting of foams, bundled fibers, matted fibers, needled fibers, nonwoven fibers, woven fibers, and porous polymers.

85. The liquid fuel reservoir of claim 84, wherein the wicking structure material is selected from the group consisting of polyurethane foam, melamine foam, polyvinyl alcohol foam, nonwoven felts of polyamide, polypropylene, polyethylene, polyester, cellulose, modified cellulose, polyacrylonitrile, or mixtures thereof, bundled, matted, needled or woven fibers of cellulose, modified cellulose, polyester, polypropylene, polyethylene, polyacrylonitrile, or mixtures thereof.

86. The liquid fuel reservoir of claim 85, wherein the wicking structure material is a polyurethane foam.

87. The liquid fuel reservoir of claim 86, wherein the wicking structure material is selected from the group consisting of a felted polyurethane foam, reticulated polyurethane foam, and felted reticulated polyurethane foam.

88. The liquid fuel reservoir of claim 75, further comprising a liquid delivery means in communication with the first port to deliver the liquid fuel out of the container through the first port.

89. The liquid fuel reservoir of claim 88, wherein the liquid delivery means is a pump.

90. The liquid fuel reservoir of claim 75, further comprising an inlet through a wall of the container, said inlet having a one-way valve to permit gas flow into the container volume and prevent liquid flow out of the container volume.

91. The liquid fuel reservoir of claim 90, further comprising a sealable, removable cap that can be attached to an end of the first port exterior to the container to make the reservoir recyclable.

92. The liquid fuel reservoir of claim 91, wherein the cap comprises a membrane for the introduction of a liquid fuel into the container volume upon puncturing the membrane with a needle, wherein the membrane is self-sealable after the needle is removed.

93. The liquid fuel reservoir of claim 90, further comprising a two-way valve in the first port for the introduction of a liquid fuel into the container volume to make the reservoir recyclable.

94. The liquid fuel reservoir of claim 75, having a liquid fuel delivery efficiency of at least 90%.

95. The liquid fuel reservoir of claim 16, wherein the at least one portion of the inner surface of the distal wall of the container is proximate an extremity of the container volume.

96. The liquid fuel reservoir of claim 95, wherein the wicking structure contacts substantially an entire inner surface of the distal wall of the container.

97. The liquid fuel reservoir of claim 17, wherein the at least one portion of the inner surface of the side wall of the container is proximate an extremity of the container volume.

98. The liquid fuel reservoir of claim 97, wherein the wicking structure contacts substantially an entire inner surface of the side wall of the container.

99. The liquid fuel reservoir of claim 20, wherein the at least one portion of the inner surface of the distal wall of the container is proximate an extremity of the container volume.

100. The liquid fuel reservoir of claim 99, wherein the wicking structure contacts substantially an entire inner surface of the distal wall of the container.

101. The liquid fuel reservoir of claim 21, wherein the at least one portion of the inner surface of the side wall of the container is proximate an extremity of the container volume.

102. The liquid fuel reservoir of claim 101, wherein the wicking structure contacts substantially an entire inner surface of the side wall of the container.



103. The liquid fuel reservoir of claim 53, wherein the at least one portion of the inner surface of the distal wall of the container is proximate an extremity of the container volume.

5 104. The liquid fuel reservoir of claim 103, wherein the wicking structure contacts substantially an entire inner surface of the distal wall of the container.

105. The liquid fuel reservoir of claim 54, wherein the at least one portion of the inner surface of the side wall of the container is proximate an extremity of the container  
10 volume.

106. The liquid fuel reservoir of claim 105, wherein the wicking structure contacts substantially an entire inner surface of the side wall of the container.

15 107. The liquid fuel reservoir of claim 79, wherein the at least one portion of the inner surface of the distal wall of the container is proximate an extremity of the container volume.

108. The liquid fuel reservoir of claim 107, wherein the wicking structure contacts  
20 substantially an entire inner surface of the distal wall of the container.

109. The liquid fuel reservoir of claim 80, wherein the at least one portion of the inner surface of the side wall of the container is proximate an extremity of the container  
25 volume.

110. The liquid fuel reservoir of claim 109, wherein the wicking structure contacts substantially an entire inner surface of the side wall of the container.

111. The liquid fuel reservoir of claim 75, wherein the wicking structure contacts inner surfaces of the extremities of the container to place every extremity of the container in fluid communication with the first port.

112. The liquid fuel reservoir of claim 75, wherein the container volume has a longest dimension, and wherein the wicking structure is capable of wicking the liquid fuel with a free rise wick height of at least one half of the longest dimension.

113. The liquid fuel reservoir of claim 112, wherein the wicking structure is capable of wicking the liquid fuel with a free rise wick height of at least the longest dimension.

114. The liquid fuel reservoir of claim 113, wherein the solid wicking structure volume is no more than 40% of the container volume.

115. The liquid fuel reservoir of claim 114, wherein the solid wicking structure volume is less than 20% of the container volume.

116. The liquid fuel reservoir of claim 115, wherein the solid wicking structure volume is less than 10% of the container volume.

117. The liquid fuel reservoir of claim 116, wherein the solid wicking structure volume is no more than 5% of the container volume.

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118. The liquid fuel reservoir of claim 117, wherein the solid wicking structure volume is no more than 3% of the container volume.

5 119. The liquid fuel reservoir of claim 118, wherein the solid wicking structure volume is about 1% of the container volume.

120. The liquid fuel reservoir of claim 113, further comprising a retainer shaped to hold the wicking structure in a desired orientation within the container volume.

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121. The liquid fuel reservoir of claim 113, wherein the walls of the container comprise at least a proximal wall through which the first port extends, a distal wall remote from the first port, and a side wall, and the wicking structure contacts at least one portion of an inner surface of the distal wall of the container.

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122. The liquid fuel reservoir of claim 121, wherein the wicking structure further contacts at least one portion of an inner surface of the side wall of the container.

123. The liquid fuel reservoir of claim 122, wherein the wicking structure further  
20 contacts at least one portion of an inner surface of the proximal wall of the container.

124. The liquid fuel reservoir of claim 121, wherein the wicking structure further contacts at least one portion of an inner surface of the proximal wall of the container.

125. The liquid fuel reservoir of claim 113, wherein the wicking structure contacts inner surfaces of the extremities of the container to place every extremity of the container in fluid communication with the first port.

5 126. The liquid fuel reservoir of claim 1, wherein the walls of the container are made of a flexible material so that the walls are collapsible.

127. The liquid fuel reservoir of claim 16, wherein the walls of the container are made of a flexible material so that the walls are collapsible.

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128. The liquid fuel reservoir of claim 46, wherein the walls of the container are made of a flexible material so that the walls are collapsible.

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129. The liquid fuel reservoir of claim 75, wherein the walls of the container are made of a flexible material so that the walls are collapsible.

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130. The liquid fuel reservoir of claim 75, wherein the container has a rectangular or square cross section, a rectangular or square shape viewed from the front, and six walls with opposite top and bottom walls, opposite first and second side walls, and opposite front and back walls, the wicking structure comprising substantially parallel first and second vertical members each having first and second ends and a horizontal member connected to the first ends of the vertical members proximate junctions of the top wall and the two side walls, the second ends of the vertical members being proximate junctions of the bottom wall and the two side walls, the first vertical member contacting substantially an entire inner surface of the first side wall, the second vertical member

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contacting substantially an entire inner surface of the second side wall, the horizontal member contacting substantially an entire inner surface of the top wall, the wicking structure having a thickness extending substantially from the front wall to the back wall, wherein a central portion of the container volume substantially lacks any portion of the wicking structure, and wherein the first port is in fluid communication with the wicking structure and extends through a wall of the container.

131. The liquid fuel reservoir of claim 130, further comprising a retainer inside the container holding the wicking structure in a desired orientation.

132. The liquid fuel reservoir of claim 131, wherein the container volume comprises a longest dimension, the wicking material being a polyurethane foam having a free rise wick height of at least one half the longest dimension for the liquid fuel.

133. The liquid fuel reservoir of claim 132, wherein the polyurethane foam has a free rise wick height of at least the longest dimension for the liquid fuel.

134. The liquid fuel reservoir of claim 133, wherein the wicking structure material is selected from the group consisting of a felted polyurethane foam, reticulated polyurethane foam, and felted reticulated polyurethane foam.

135. The liquid fuel reservoir of claim 133, further comprising a liquid delivery means in communication with the first port to deliver the liquid fuel out of the container through the first port.

136. The liquid fuel reservoir of claim 135, wherein the liquid delivery means is a pump.

137. The liquid fuel reservoir of claim 133, further comprising an inlet through a wall of the container, said inlet having a one-way valve to permit gas flow into the container volume and prevent liquid flow out of the container volume.

138. The liquid fuel reservoir of claim 75, wherein the container has a rectangular or square cross section, a rectangular or square shape viewed from the front, and six walls with opposite top and bottom walls, opposite first and second side walls, and opposite front and back walls, the wicking structure resembling the shape of an alphabet letter "H" viewed from the front and comprising substantially parallel first and second vertical members each having first and second ends and a horizontal member connected to the vertical member distant from the first and second ends, the first ends of the vertical members being proximate junctions of the top wall and the two side walls, the second ends of the vertical members being proximate junctions of the bottom wall and the two side walls, the first vertical member contacting substantially an entire inner surface of the first side wall, the second vertical member contacting substantially an entire inner surface of the second side wall, the horizontal member extending through the container volume, the wicking structure having a thickness extending substantially from the front wall to the back wall, wherein a central portion of the container volume substantially lacks any portion of the wicking structure except the horizontal member, and wherein the first port is in fluid communication with the wicking structure via one of the vertical members and extends through a wall of the container.

139. The liquid fuel reservoir of claim 138, further comprising a retainer inside the container holding the wicking structure in a desired orientation.

140. The liquid fuel reservoir of claim 138, wherein the container volume comprises a longest dimension, the wicking material being a polyurethane foam having a free rise wick height of at least one half the longest dimension for the liquid fuel.

141. The liquid fuel reservoir of claim 140, wherein the polyurethane foam has a free rise wick height of at least the longest dimension for the liquid fuel.

142. The liquid fuel reservoir of claim 141, wherein the wicking structure material is selected from the group consisting of a felted polyurethane foam, reticulated polyurethane foam, and felted reticulated polyurethane foam.

143. The liquid fuel reservoir of claim 141, further comprising a liquid delivery means in communication with the first port to deliver the liquid fuel out of the container through the first port.

144. The liquid fuel reservoir of claim 143, wherein the liquid delivery means is a pump.

145. The liquid fuel reservoir of claim 141, further comprising an inlet through a wall of the container, said inlet having a one-way valve to permit gas flow into the container volume and prevent liquid flow out of the container volume.

146. The liquid fuel reservoir of claim 75, wherein the container has a rectangular or square cross section, a rectangular or square shape viewed from the front, and six walls with opposite top and bottom walls, opposite first and second side walls, and opposite front and back walls, the wicking structure resembling the shape of an alphabet letter "K" viewed from the front and comprising a vertical member having two ends and first and second slanted members each having first and second ends, the first ends of the first and second slanted members being connected to the vertical member at the same location distant from the two ends of the first member, the vertical member contacting substantially an entire inner surface of the first side wall, the first slanted member extending across the container volume such that the second end of the first slanted member being proximate a corner formed by the top wall and second side wall, the second slanted member extending across the container volume such that the second end of the second slanted member being proximate a corner formed by the bottom wall and second side wall, the wicking structure having a thickness extending substantially from the front wall to the back wall, wherein a central portion of the container volume substantially lacks any portion of the wicking structure except portions of the slanted members, and wherein the first port is in fluid communication with the wicking structure via the vertical member and extends through a wall of the container.

147. The liquid fuel reservoir of claim 146, further comprising a retainer inside the container holding the wicking structure in a desired orientation.

148. The liquid fuel reservoir of claim 146, wherein the container volume comprises a longest dimension, the wicking material being a polyurethane foam having a free rise wick height of at least one half the longest dimension for the liquid fuel.



149. The liquid fuel reservoir of claim 148, wherein the polyurethane foam has a free rise wick height of at least the longest dimension for the liquid fuel.

5 150. The liquid fuel reservoir of claim 149, wherein the wicking structure material is selected from the group consisting of a felted polyurethane foam, reticulated polyurethane foam, and felted reticulated polyurethane foam.

151. The liquid fuel reservoir of claim 149, further comprising a liquid delivery means  
10 in communication with the first port to deliver the liquid fuel out of the container through the first port.

152. The liquid fuel reservoir of claim 151, wherein the liquid delivery means is a pump.

15 153. The liquid fuel reservoir of claim 149, further comprising an inlet through a wall of the container, said inlet having a one-way valve to permit gas flow into the container volume and prevent liquid flow out of the container volume.

20 154. The liquid fuel reservoir of claim 75, wherein the container has a rectangular or square cross section, a rectangular or square shape viewed from the front, and six walls with opposite top and bottom walls, opposite first and second side walls, and opposite front and back walls, the wicking structure resembling the shape of an alphabet letter "K" turned 90° when viewed from the front and comprising a horizontal member having  
25 two ends and first and second slanted members each having first and second ends, the

first ends of the first and second slanted members being connected to the horizontal member at a location distant from the two ends of the horizontal member, the horizontal member contacting substantially an entire inner surface of the top wall, the first slanted member extending across the container volume such that the second end of the first slanted member being proximate a corner formed by the bottom wall and first side wall, the second slanted member extending across the container volume such that the second end of the second slanted member being proximate a corner formed by the bottom wall and second side wall, the wicking structure having a thickness extending substantially from the front wall to the back wall, wherein a central portion of the container volume substantially lacks any portion of the wicking structure except portions of the slanted members, and wherein the first port is in fluid communication with the wicking structure via the horizontal member and extends through a wall of the container.

155. The liquid fuel reservoir of claim 75, wherein the container has a rectangular or square cross section, a rectangular or square shape viewed from the front, and six walls with opposite top and bottom walls, opposite first and second side walls, and opposite front and back walls, the wicking structure resembling the shape of a symbol "π" turned 90° when viewed from the front and comprising a vertical member having top and bottom ends and first and second slanted members each having first and second ends, the vertical member contacting substantially an entire inner surface of the first side wall with the top end of the vertical member proximate a corner formed by the top and first side wall and with the bottom end of the vertical member proximate a corner formed by the bottom and first side wall, the first end of the first slanted member being connected to the vertical member at a location distant from the top end of the vertical member, the first end of the second slanted member being connected to the vertical member at a

location between the bottom end of the vertical member and the junction of the first slanted member and the vertical member, the first slanted member extending across the container volume such that the second end of the first slanted member being proximate a corner formed by the top wall and second side wall, the second slanted member  
5 extending across the container volume such that the second end of the second slanted member being proximate a corner formed by the bottom wall and second side wall, the wicking structure having a thickness extending substantially from the front wall to the back wall, wherein a central portion of the container volume substantially lacks any portion of the wicking structure, and wherein the first port is in fluid communication with  
10 the wicking structure via the vertical member and extends through a wall of the container.

156. The liquid fuel reservoir of claim 75, wherein the container has a rectangular or square cross section, a rectangular or square shape viewed from the front, and six walls  
15 with opposite top and bottom walls, opposite first and second side walls, and opposite front and back walls, the wicking structure resembling the shape of a symbol " $\pi$ " when viewed from the front and comprising a horizontal member having first and second ends and first and second slanted members each having first and second ends, the horizontal member contacting substantially an entire inner surface of the top wall with the first end  
20 of the horizontal member proximate a corner formed by the top and first side wall and with the second end of the vertical member proximate a corner formed by the top and second side wall, the first end of the first slanted member being connected to the horizontal member at a location distant from the first end of the vertical member, the first end of the second slanted member being connected to the horizontal member at a  
25 location between the second end of the horizontal member and the junction of the first

slanted member and the horizontal member, the first slanted member extending across the container volume such that the second end of the first slanted member being proximate a corner formed by the bottom wall and first side wall, the second slanted member extending across the container volume such that the second end of the second slanted member being proximate a corner formed by the bottom wall and second side wall, the wicking structure having a thickness extending substantially from the front wall to the back wall, wherein a central portion of the container volume substantially lacks any portion of the wicking structure, and wherein the first port is in fluid communication with the wicking structure via the horizontal member and extends through a wall of the container.

157. The liquid fuel reservoir of claim 75, wherein the container has a rectangular or square cross section, a rectangular or square shape viewed from the front, and six walls with opposite top and bottom walls, opposite first and second side walls, and opposite front and back walls, the wicking structure resembling the shape of an alphabet letter "X" viewed from the front and comprising first and second slanted members each having top and bottom ends, the first and second slanted members being connected at a location distant from the two ends, the top end of the first slanted member proximate a corner formed by the top and first side wall of the container, the first slanted member extending diagonally across the container volume such that the bottom end of the first slanted member being proximate a corner formed by the bottom wall and second side wall, the top end of the second slanted member proximate a corner formed by the top wall and second side wall of the container, the second slanted member extending diagonally across the container volume such that the bottom end of the second slanted member being proximate a corner formed by the bottom wall and first side wall of the

container, the wicking structure having a thickness extending substantially from the front wall to the back wall, wherein a central portion of the container volume substantially lacks any portion of the wicking structure except portions of the slanted members.

5      158. The liquid fuel reservoir of claim 157, wherein the first port is in fluid communication with the wicking structure via a location proximate a junction of the first and second slanted members and extends through the front or back wall of the container.

10      159. The liquid fuel reservoir of claim 157, further comprising a retainer inside the container holding the wicking structure in a desired orientation.

15      160. The liquid fuel reservoir of claim 158, wherein the container volume comprises a longest dimension, the wicking material being a polyurethane foam having a free rise wick height of at least one half the longest dimension for the liquid fuel.

161. The liquid fuel reservoir of claim 157, wherein the container volume comprises a longest dimension, the wicking material being a polyurethane foam having a free rise wick height of at least the longest dimension for the liquid fuel.

20      162. The liquid fuel reservoir of claim 160, wherein the wicking structure material is selected from the group consisting of a felted polyurethane foam, reticulated polyurethane foam, and felted reticulated polyurethane foam.

163. The liquid fuel reservoir of claim 157, further comprising a liquid delivery means in communication with the first port to deliver the liquid fuel out of the container through the first port.

5 164. The liquid fuel reservoir of claim 163, wherein the liquid delivery means is a pump.

165. The liquid fuel reservoir of claim 157, further comprising an inlet through a wall of the container, said inlet having a one-way valve to permit gas flow into the container  
10 volume and prevent liquid flow out of the container volume.

166. The liquid fuel reservoir of claim 75, wherein the container has a rectangular or square cross section, a rectangular or square shape viewed from the front, and six walls with opposite top and bottom walls, opposite first and second side walls, and opposite  
15 front and back walls, the wicking structure resembling an alphabet letter "E" turned 90° when viewed from the front and comprising substantially parallel first, second and third vertical members each having first and second ends and a horizontal member having first and second ends. the first end of the first vertical member being connected to the first end of the horizontal member proximate a junction of the top and the first side wall,  
20 the first end of the third vertical member being connected to the second end of the horizontal member proximate a junction of the top wall and the second side wall, the first end of the second vertical member being connected to the horizontal member at a location between the two ends of the horizontal member, the second end of the first vertical member being proximate a junction of the bottom wall and the first side walls,  
25 the second end of the third vertical member being proximate a junction of the bottom

wall and the second side walls, the second end of the second vertical member being proximate the bottom wall, the first vertical member contacting substantially an entire inner surface of the first side wall, the third vertical member contacting substantially an entire inner surface of the second side wall, the horizontal member contacting  
5 substantially an entire inner surface of the top wall, the wicking structure having a thickness extending substantially from the front wall to the back wall, wherein a central portion of the container volume substantially lacks any portion of the wicking structure except a portion of the second vertical member, and wherein the first port is in fluid communication with the wicking structure and extends through a wall of the container.

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167. The liquid fuel reservoir of claim 166, further comprising a retainer inside the container holding the wicking structure in a desired orientation.

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168. The liquid fuel reservoir of claim 166, wherein the container volume comprises a longest dimension, the wicking material being a polyurethane foam having a free rise wick height of at least one half the longest dimension for the liquid fuel.

169. The liquid fuel reservoir of claim 168, wherein the polyurethane foam has a free rise wick height of at least the longest dimension for the liquid fuel.

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170. The liquid fuel reservoir of claim 168, wherein the wicking structure material is selected from the group consisting of a felted polyurethane foam, reticulated polyurethane foam, and felted reticulated polyurethane foam.

171. The liquid fuel reservoir of claim 166, further comprising a liquid delivery means in communication with the first port to deliver the liquid fuel out of the container through the first port.

5 172. The liquid fuel reservoir of claim 171, wherein the liquid delivery means is a pump.

173. The liquid fuel reservoir of claim 166, further comprising an inlet through a wall of the container, said inlet having a one-way valve to permit gas flow into the container  
10 volume and prevent liquid flow out of the container volume.

174. The liquid fuel reservoir of claim 39, wherein the wicking structure material is a felted polyurethane foam or felted reticulated polyurethane foam having a density in the range of about 3 to about 40 pounds per cubic foot, prepared with a compression ratio  
15 in the range of 1.5 to 20.

175. The liquid fuel reservoir of claim 74, wherein the wicking structure material is a felted polyurethane foam or felted reticulated polyurethane foam having a density in the range of about 3 to about 10 pounds per cubic foot, prepared with a compression ratio  
20 in the range of 3 to 30.

176. The liquid fuel reservoir of claim 1, wherein the wicking structure material is perforated.



177. The liquid fuel reservoir of claim 176, wherein at least one external surface of the wicking structure material is proximate at least a wall of the container, said wicking structure material being perforated except in a portion of the wicking structure material proximate the at least one external surface.

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178. The liquid fuel reservoir of claim 176, wherein at least one external surface of the wicking structure material is proximate at least a wall of the container, said wicking structure material being perforated except in a portion of the wicking structure material extending from the at least one external surface to a depth of about 20% of a thickness of the wicking structure material locally, wherein the thickness locally is the length of a first imaginary line perpendicular to a second imaginary line tangential to the at least one external surface of the wicking structure locally, which first imaginary line starts at the at least one external surface, extends through the wicking structure material and ends at where the first imaginary line meets an external surface of the wicking structure material opposite to the at least one external surface.

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179. The liquid fuel reservoir of claim 178, wherein said wicking structure material is perforated except in a portion of the wicking structure material extending from the at least one external surface to a depth of about 10% of the thickness of the wicking structure material locally.

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180. The liquid fuel reservoir of claim 179, wherein said wicking structure material is perforated except in a portion of the wicking structure material extending from the at least one external surface to a depth of about 5% of the thickness of the wicking structure material locally.

25

181. The liquid fuel reservoir of claim 1, wherein the wicking structure has substantially no wicking structure material in the central portion of the volume within the container.

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182. The liquid fuel reservoir of claim 181, wherein the central portion of the volume within the container is the inner 70% of the volume within the container.

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183. The liquid fuel reservoir of claim 182, wherein the central portion of the volume within the container is the inner 80% of the volume within the container.

184. The liquid fuel reservoir of claim 183, wherein the central portion of the volume within the container is the inner 90% of the volume within the container.

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185. The liquid fuel reservoir of claim 184, wherein the central portion of the volume within the container is the inner 95% of the volume within the container.

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186. A liquid fuel reservoir for a liquid fuel cell comprising  
(a) a container having 5, 6, 7, 8, 9 or 10 walls: a first and second end walls and 3, 4, 5, 6, 7 or 8 lateral walls, wherein the first and second end walls are opposite to each other and each of the lateral walls is connected to the first and second end walls and to two adjacent lateral walls, wherein the container has a triangular, quadrilateral, pentagonal, hexagonal, heptagonal or octagonal cross section formed by the lateral walls, said walls defining a volume suitable for holding a liquid fuel for the liquid fuel cell;  
wherein the container has an first port through one of the walls suitable for the exit of

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the liquid fuel to a location exterior to the container, the container having at least one corner of the volume within the container formed by a junction of one of the end walls and two contiguous lateral walls remote from the first port; and

(b) a wicking structure disposed within the volume of the container, wherein the wicking structure comprises a layer of a wicking structure material which can wick the liquid fuel and wherein the liquid fuel wicked into the wicking structure material can subsequently be discharged out of or released from the wicking structure material, and wherein the layer is disposed adjacent to at least all but one of the lateral walls of the container, and wherein an edge of the layer is proximate a portion of the first end wall and an opposite edge of the layer is proximate a portion of the second end wall, said wicking structure being in fluid communication with the first port and extending proximate the at least one corner to place the at least one corner in fluid communication with the first port, in any orientation of the container, and at substantially any stage of liquid fuel depletion, to permit liquid fuel located proximate the at least one corner to be wicked to the first port.

187. The liquid fuel reservoir of claim 186, wherein the layer of the wicking structure material is disposed adjacent to all of the lateral walls of the container.

188. The liquid fuel reservoir of claim 186, wherein the container has 4 lateral walls and a rectangular or square cross section formed by the lateral walls.

189. A liquid fuel reservoir for a liquid fuel cell comprising

(a) a container having 3 walls: a first and second end walls and a curved lateral wall, wherein the first and second end walls are opposite to each other and the curved

lateral wall is connected to the first and second end walls, wherein the container has a circular, oval or elliptic cross section formed by the curved lateral wall, said walls defining a volume for holding a liquid fuel for the liquid fuel cell; wherein the container has a first port through one of the walls for the exit of the liquid fuel to a location exterior to the container, the container having at least one extremity remote from the first port, wherein said at least one extremity is at least one region of the volume within the container proximate the junction of one of the end walls and the curved lateral wall; and

(b) a wicking structure disposed within the volume of the container, wherein the wicking structure comprises a layer of a wicking structure material which can wick the liquid fuel and wherein the liquid fuel wicked into the wicking structure material can subsequently be discharged out of or released from the wicking structure material, and wherein the layer is disposed adjacent to the curved lateral wall of the container, and wherein an edge of the layer is proximate a portion of the first end wall and an opposite edge of the layer is proximate a portion of the second end wall, said wicking structure being in fluid communication with the first port and extending proximate the at least one extremity to place the at least one extremity in fluid communication with the first port, in any orientation of the container, and at substantially any stage of liquid fuel depletion, to permit liquid fuel located proximate the at least one extremity to be wicked to the first port.

190. The liquid fuel reservoir of claim 189, wherein the container has a circular cross section formed by the curved lateral wall.

191. A method of dispensing a liquid fuel from a container to a liquid fuel cell or reformer, said method comprising the following steps:

- (a) providing the container of claim 1 holding the liquid fuel;
- (b) wicking at least a portion of the liquid fuel into the wicking structure and through the wicking structure to a location proximate the first port; and
- (c) activating the pressurized pallet or bladder to deliver the liquid fuel from the wicking structure to a location exterior to the container through the first port.

192. The method of claim 191, wherein the wicking structure is held by a retainer in a desired orientation within the volume of the container.

193. The method of claim 191, wherein step (d) is carried out by pumping the liquid fuel out of the wicking structure to the exterior location.

194. The method of claim 191, further providing an inlet through a wall of the container in step (a), wherein the inlet has a one-way valve to permit inflow of a gas and prevent the outflow of any liquid.

195. The method of claim 191, wherein the walls of the container comprise at least a proximal wall through which the first port enters, a distal wall remote from the first port, and a side wall, and the wicking structure contacts at least one portion of an inner surface of the distal wall of the container.

196. The method of claim 195, wherein the wicking structure further contacts at least one portion of an inner surface of the side wall of the container.

197. The method of claim 196, wherein the wicking structure further contacts at least one portion of an inner surface of the proximal wall of the container.

198. The method of claim 191, wherein said wicking structure material is selected from the group consisting of foams, bundled fibers, matted fibers, nonwoven fibers, woven fibers, needled fibers, porous polymers, Porex, and inorganic porous materials.

199. The method of claim 198, wherein the wicking structure material is selected from the group consisting of polyurethane foam, melamine foam, polyvinyl alcohol foam, nonwoven felts of polyamide, polypropylene, polyethylene, polyester, cellulose, polyacrylonitrile, or mixtures thereof, bundled, matted, needled or woven fibers of cellulose, modified cellulose, polyester, polypropylene, polyethylene, polyacrylonitrile, or mixtures thereof.

200. The method of claim 199, wherein the wicking structure material is a polyurethane foam.

201. The method of claim 191, wherein the walls of the container are made of a flexible material so that the walls are collapsible.

202. The liquid fuel reservoir of claim 1, wherein the container further comprises a second port which penetrates a wall of the container, and wherein the pressurized pallet or bladder is connected to the second port, which port allows a fluid to be introduced into the pressurized pallet or bladder.

203. The liquid fuel reservoir of claim 202, wherein the fluid introduced into the pressurized pallet or bladder is a pressurized fluid.

204. The liquid fuel reservoir of claim 203, wherein the pressurized fluid is a  
5 pressurized gas.

205. The liquid fuel reservoir of claim 202, wherein the pressurized pallet or bladder comprises a compressible porous material and a wall impermeable to a liquid fuel.

10 206. The liquid fuel reservoir of claim 205, wherein the compressible porous material is of a volume, when at a relaxed state, larger than the container volume.

207. The liquid fuel reservoir of claim 206, wherein the wall of the pressurized pallet or bladder is impermeable to a spent fuel or byproduct of a liquid fuel cell, and wherein the  
15 fluid introduced into the pressurized pallet or bladder is the spent fuel or byproduct.

208. The liquid fuel reservoir of claim 205, wherein the container further comprises a third port through at least one wall of the container for introducing a liquid fuel into the container volume.

20 209. The liquid fuel reservoir of claim 205, wherein the first port has a valve.

210. The liquid fuel reservoir of claim 205, wherein the pressurized pallet or bladder further comprises a flexible membrane covering a portion of the compressible porous

material to prevent any direct contact of the compressible porous material with a liquid fuel when the container is filled with the liquid fuel.

211. The liquid fuel reservoir of claim 205, wherein the pressurized pallet or bladder further comprises a coating covering a portion of the compressible porous material to prevent any direct contact of the compressible porous material with a liquid fuel when the container is filled with the liquid fuel.

212. The liquid fuel reservoir of claim 15, wherein the compressible porous material of the pressurized pallet or bladder is of a volume, when at a relaxed state, larger than the container volume.

213. The liquid fuel reservoir of claim 212, wherein the first port has a valve.

214. The liquid fuel reservoir of claim 213, wherein the pressurized pallet or bladder further comprises a flexible membrane covering a portion of the compressible porous material to prevent any direct contact of the compressible porous material with a liquid fuel when the container is filled with the liquid fuel.

215. The liquid fuel reservoir of claim 213, wherein the pressurized pallet or bladder further comprises a coating covering a portion of the compressible porous material to prevent any direct contact of the compressible porous material with a liquid fuel when the container is filled with the liquid fuel.



216. A method of delivering a liquid fuel to a liquid fuel cell, comprising the following steps:

(I) providing a liquid fuel reservoir comprising

a container comprising walls defining a container volume holding a liquid fuel, an  
5 first port through a wall of the container capable of discharging the liquid fuel to a  
location exterior of the container volume, a second port through a wall of the container  
and at least one extremity remote from the first port, wherein the first port has inner and  
outer ends; and

a wicking structure within the container volume and into which the liquid fuel can  
10 wick by capillary action and from which the liquid fuel may subsequently be discharged,  
the wicking structure

(a) having a solid wicking structure volume which is no more than 50% of the  
container volume;

(b) being in fluid communication with the first port; and

15 (c) extending from proximate the at least one extremity to proximate the inner  
end of the first port in order to place the at least one extremity in fluid communication  
with the first port, in any orientation of the container, and at substantially any stage of  
liquid fuel depletion, to permit liquid fuel located proximate the at least one extremity to  
be wicked to the first port; and

20 (II) applying a positive pressure to the container via the second port to deliver the liquid  
fuel out of the first port to a location exterior to the container.